

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSIII)

TPC6005

Notebook PC Applications

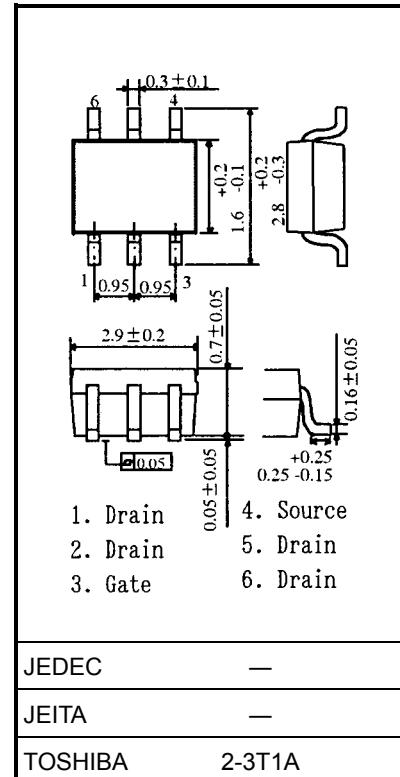
Portable Equipment Applications

Unit: mm

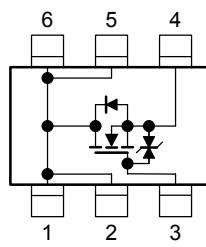
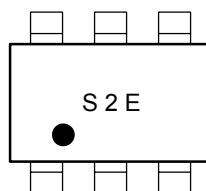
- Low drain-source ON resistance: $R_{DS(ON)} = 21 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 10 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement-model: $V_{th} = 0.5$ to 1.2 V ($V_{DS} = 10 \text{ V}$, $I_D = 200 \mu\text{A}$)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	30	V
Gate-source voltage		V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	6	A
	Pulse (Note 1)	I_{DP}	24	
Drain power dissipation (t = 5 s) (Note 2a)		P_D	2.2	W
Drain power dissipation (t = 5 s) (Note 2b)		P_D	0.7	W
Single pulse avalanche energy (Note 3)		E_{AS}	5.8	mJ
Avalanche current		I_{AR}	3	A
Repetitive avalanche energy (Note 4)		E_{AR}	0.22	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°C



Weight: 0.011 g (typ.)

Circuit Configuration**Marking (Note 5)****Thermal Characteristics**

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 5 s) (Note 2a)	$R_{th(ch-a)}$	56.8	°C/W
Thermal resistance, channel to ambient (t = 5 s) (Note 2b)	$R_{th(ch-a)}$	178.5	°C/W

Note: (Note 1), (Note 2), (Note 3), (Note 4), (Note 5) Please see next page.

This transistor is an electrostatically sensitive device. Please handle it with caution.

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

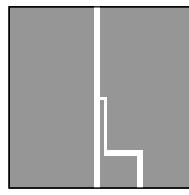
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-OFF current	I_{DSS}	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	μA
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
	$V_{(\text{BR})\text{DSX}}$	$I_D = 10\text{ mA}, V_{GS} = -12\text{ V}$	18	—	—	
Gate threshold voltage	V_{th}	$V_{DS} = 10\text{ V}, I_D = 200\text{ }\mu\text{A}$	0.5	—	1.2	V
Drain-source ON resistance	$R_{DS(\text{ON})}$	$V_{GS} = 2.0\text{ V}, I_D = 3\text{ A}$	—	31	41	$\text{m}\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 3\text{ A}$	—	27	35	
		$V_{GS} = 4.5\text{ V}, I_D = 3\text{ A}$	—	21	28	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 3\text{ A}$	5	10	—	S
Input capacitance	C_{iss}	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1420	—	pF
Reverse transfer capacitance	C_{rss}		—	170	—	
Output capacitance	C_{oss}		—	180	—	
Switching time	Rise time	t_r	 V_{GS} 5 V 0 V $I_D = 3\text{ A}$ $V_{DD} \approx 15\text{ V}$ Duty $\leq 1\%$, $t_W = 10\text{ }\mu\text{s}$	—	8	—
	Turn-ON time	t_{on}		—	13	—
	Fall time	t_f		—	18	—
	Turn-OFF time	t_{off}		—	70	—
Total gate charge (gate-source plus gate-drain)	Q_g	$V_{DD} \approx 24\text{ V}, V_{GS} = 5\text{ V}, I_D = 6\text{ A}$	—	19	—	nC
Gate-source charge	Q_{gs}		—	13.5	—	
Gate-drain ("miller") charge	Q_{gd}		—	5.5	—	

Source-Drain Ratings and Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	24	A
Forward voltage (Diode)	V_{DSF}	$I_{DR} = 6\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V

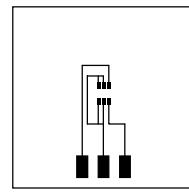
Note 1: Please use devices on condition that the channel temperature is below 150°C .

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



FR-4
 $25.4 \times 25.4 \times 0.8$
Unit: (mm)

(a)



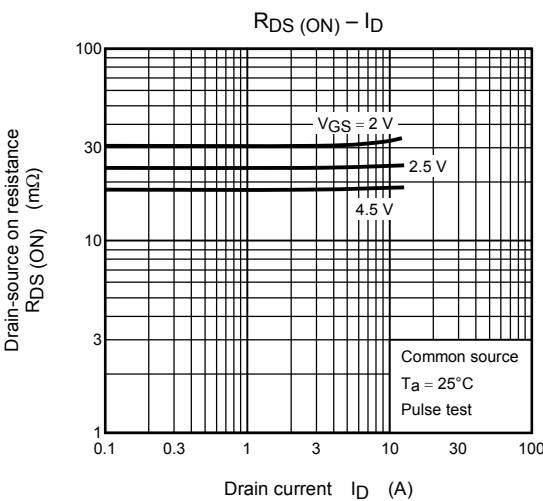
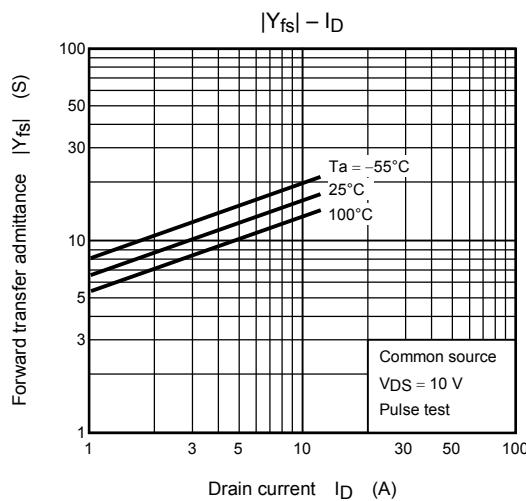
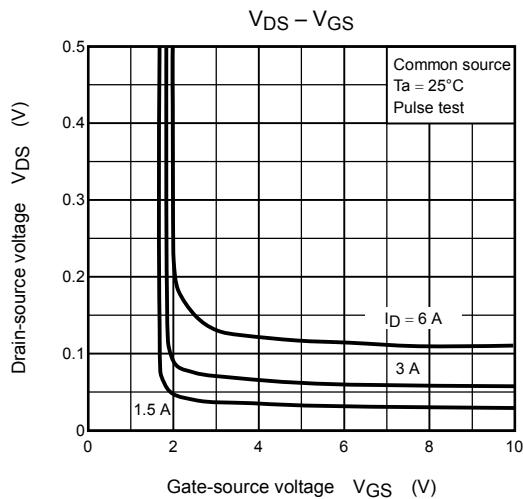
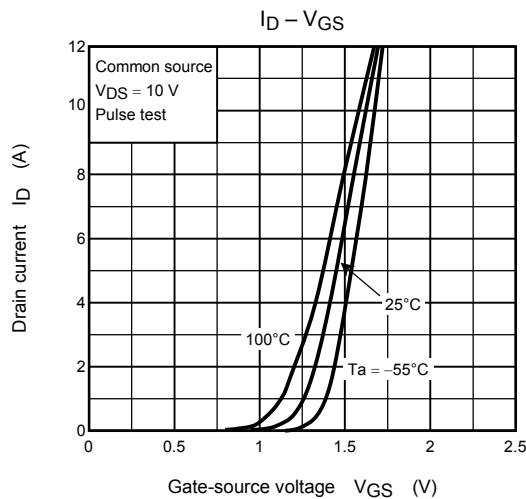
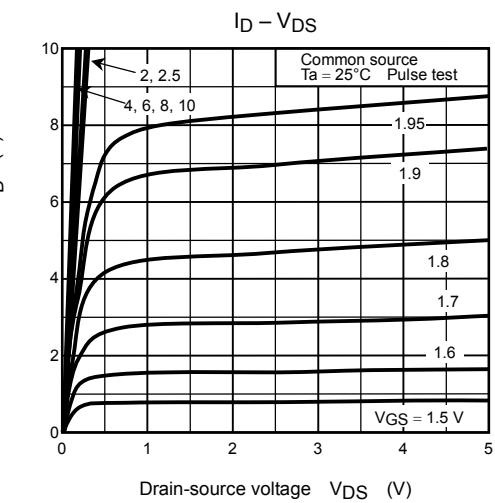
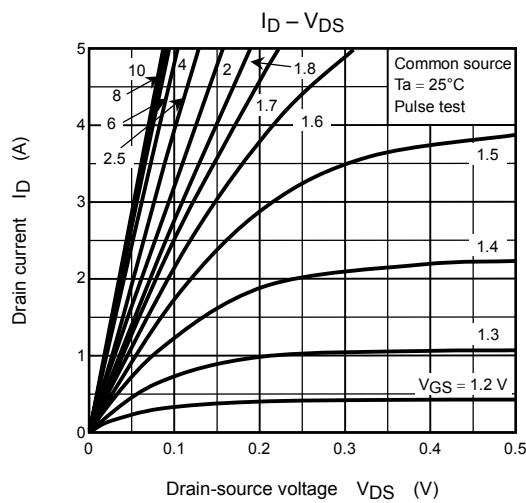
FR-4
 $25.4 \times 25.4 \times 0.8$
Unit: (mm)

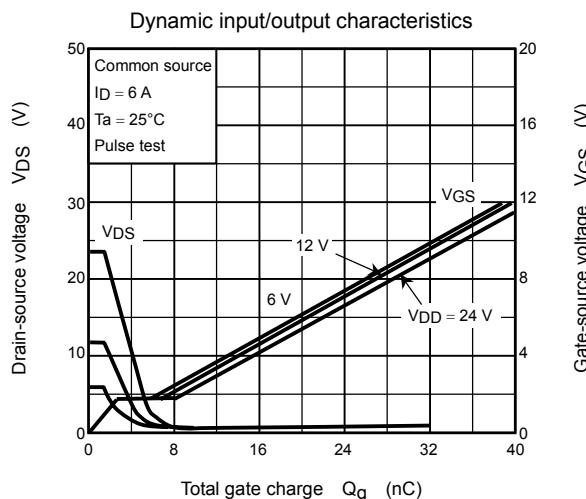
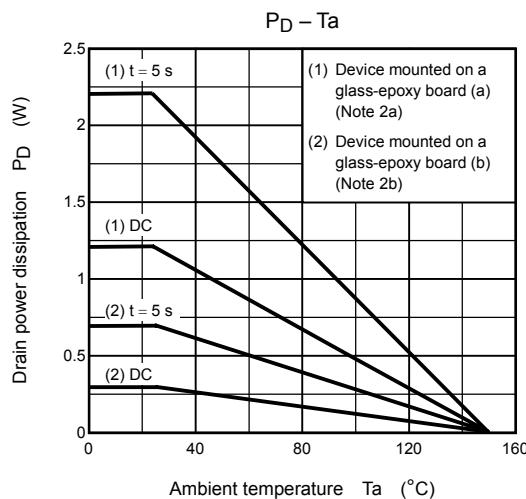
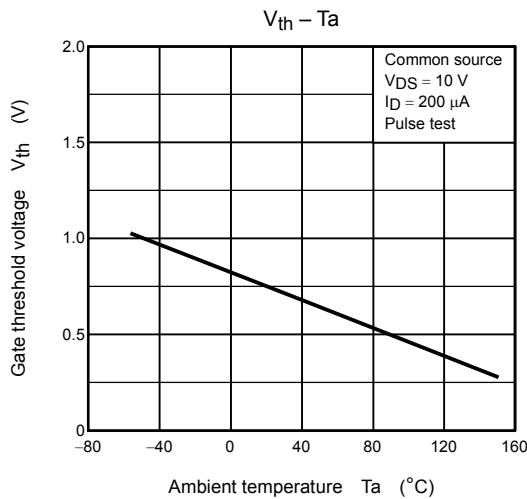
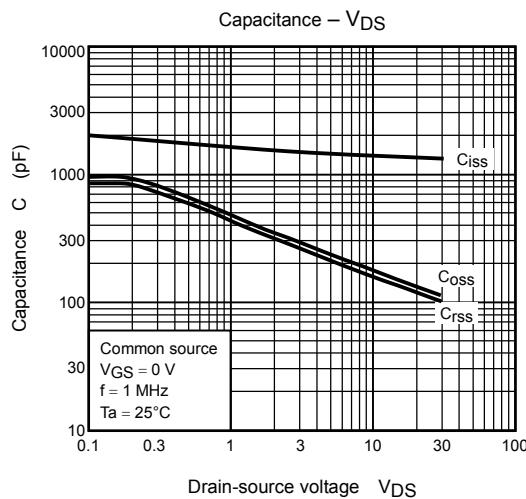
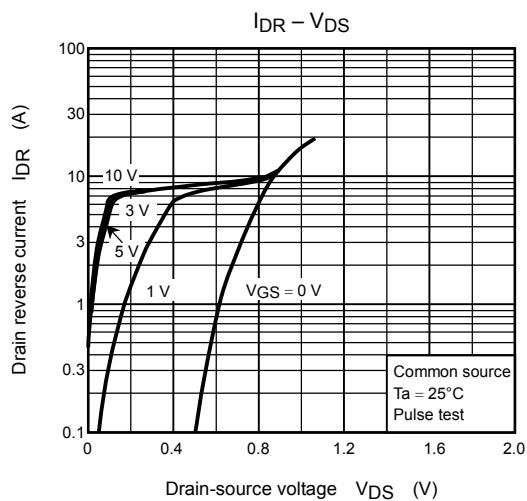
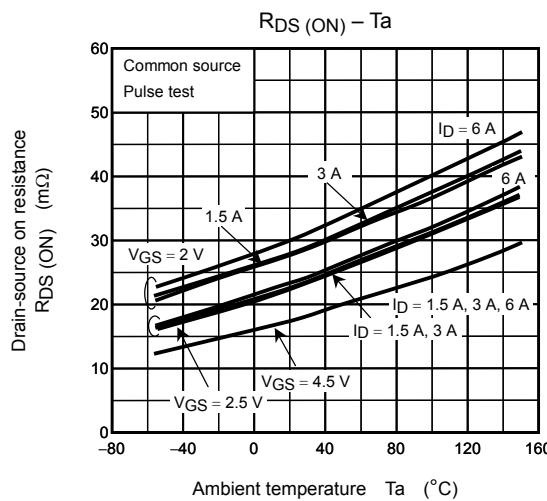
(b)

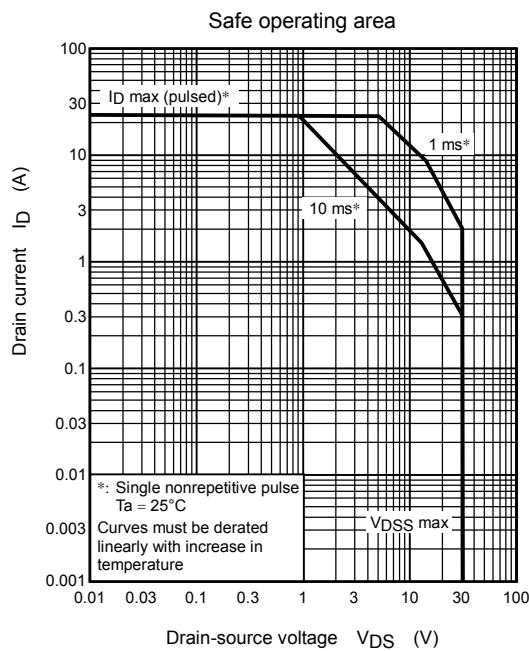
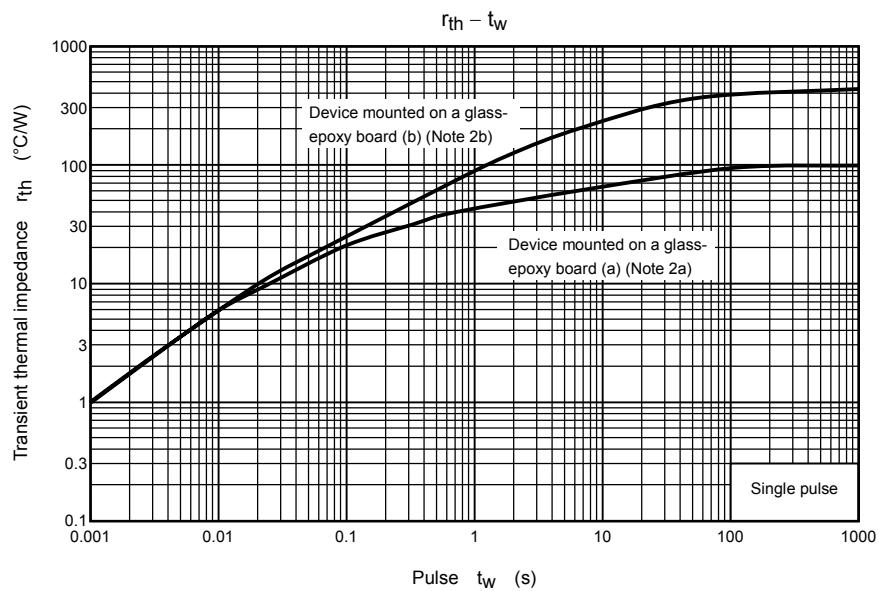
Note 3: $V_{DD} = 24\text{ V}, T_{ch} = 25^\circ\text{C}$ (initial), $L = 0.5\text{ mH}, R_G = 25\text{ }\Omega, I_{AR} = 3.0\text{ A}$

Note 4: Repetitive rating; pulse width limited by maximum channel temperature

Note 5: Black round marking “•” locates on the left lower side of parts number marking “S2E” indicates terminal No.1.







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